

## 

(43) International Publication Date 3 February 2005 (03.02.2005)

PCT

## (10) International Publication Number WO 2005/010363 A3

(51) International Patent Classification<sup>7</sup>: F16K 15/16

F04B 39/10,

(21) International Application Number:

PCT/US2004/023833

(22) International Filing Date:

23 July 2004 (23.07.2004)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data: 60/489,425

23 July 2003 (23.07.2003) U.

- (71) Applicant (for all designated States except US): HAR-GRAVES TECHNOLOGY CORPORATION [US/US]; 127 Speedway Drive, Mooresville, NC 28117 (US).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): HARGRAVES, Donald, Edwin [US/US]; 14100 Wynfield Creek Parkway, Huntersville, NC 28078 (US). CURTIS, Douglas, Allan [US/US]; 143 Denlon Lane, Troutman, NC 28166 (US).
- (74) Agents: ADAMS, Thad, W., III et al.; Adams Evans P.A., 2180 Two Wachovia Center, Charlotte, NC 28282 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

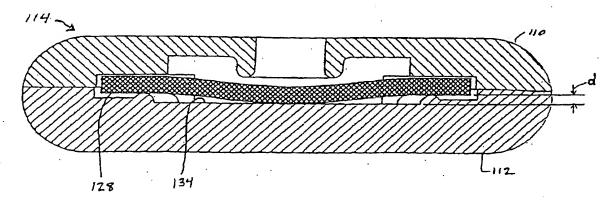
## Published:

- with international search report
  - with amended claims
- (88) Date of publication of the international search report: 14 July 2005

Date of publication of the amended claims: 1 September 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: PUMP VALVE WITH CONTROLLED STROKE



(57) Abstract: A valve assembly for a pump includes a pump chamber and a pump head having complementary recesses formed therein which cooperate to define a valve compartment including a pocket and an opposed seat. A flexible valve element is disposed between the recesses and adapted to move between a closed position against the seat which prevents fluid flow and an open position away from the valve seat which permits fluid flow. The dimensions of the valve compartment are selected to limit the movement of the valve element in the open position, which increases the pump efficiency and prevents damage to the valve element and/or valve overlap.



